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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR NOVEMBER 1936

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FRUIT INSECT INVESTIGATIONS

Shade-cloth protection of drying pears.--H. C. Donohoe and Perez Simmons, of the Fresno, Calif., dried-fruit insect laboratory, report that experimental drying of pears on protected stacked trays gave satisfactory exclusion of the raisin moth. Pears covered with shade cloth during drying on stacked trays and during temporary storage in picking boxes became infested only 1 percent. Exposure of the fruit during stack drying resulted in infestation of 23 percent of the halves. Pears not protected at any time (the usual procedure) became infested 56 percent. The results correspond with those obtained in 1935. Drying under shade cloth produced cleaner fruit, of better color and texture.

Parasitization of Japanese beetle by Tiphia popilliavora crosses.--At the Moorestown, N. J., laboratory, T. R. Gardner has made studies of crossing several strains of *T. popilliavora* Roh., an imported parasite of the Japanese beetle. Grubs parasitized in September and October by the Korean strain and by crosses of this with the Japanese strain, have been examined recently to determine the extent of cocoon formation. The results are shown in the following table.

Strain	Grubs parasitized	Cocoons formed	Cocoon formation
	Number	Number	Percent
Korean	32,045	24,345	75.9
F-2 generation, Korean female X-Japanese male	3,568	2,606	73.4
F-2 generation, Japanese female X-Korean male	2,925	2,174	74.3

Citronella oil a possible substitute for geraniol as Japanese beetle attractant.--The Moorestown laboratory reports work, on which F. W. Metzger has been engaged, concerning the possible substitution of citronella oil for geraniol as bait for Japanese beetle traps. Nine samples of Java citronella oil and an equal number of Ceylon citronella oil proved to be somewhat more attractive than the grade of geraniol now used, but, when eugenol was added, a precipitate formed in a number of the samples of Ceylon oil. On the basis of present information there appears to be no definite correlation between attraction and the chemical and physical properties of oil of these two types, but it is evident that at least certain grades of citronella oil are promising cheaper substitutes for geraniol.

Experimental rearing of oriental fruit moth parasites.--Experiments conducted this season by G. J. Haeussler, of the oriental fruit moth project at Moorestown, indicate the possibility of utilizing growing peach trees enclosed in a cloth-covered cage for rearing certain species of oriental fruit moth parasites. The tests were made in a large cage constructed over 30 3-year-old trees, the cage being divided into 8 compartments in which most of the various species were tested individually. An increase in the number of females produced over the number used for rearing was obtained for only three species--*Bassus diversus* Mues., *Dioctes molestae* Uch., and *Orgilus longiceps* Mues. Production of female progeny was fairly good also for *Eugadizon extensor* (Linn.) and *Macrocentrus thoracicus* (Nees), reared together, *Macrocentrus ancylivorus* Roh., *Glypta rufiscutellaris* Cress., and the imported Japanese *Apanteles* spp. The sex ratio in the last three named was particularly in favor of the females. Other species tested gave entirely unsatisfactory results. Observations indicated that the trees used in early season tests with *B. diversus* remained in much better condition throughout the season with regard to continued availability of succulent twigs suitable for infestation than those on which tests were delayed until parasites of the other species became available. This was partly responsible for the comparative success obtained in the rearing of *B. diversus*. The experiment has indicated that all of the species named above can be reared with varying degrees of success from caged trees by the methods used this season, provided the inoculations are started early enough in the season and undue competition between species is avoided. The results obtained with the species tested are summarized in the following table.

Species	Period of test	Females used	Progeny produced		Average progeny per female	Sex ratio, females
			Total	Females		
		Number	Number	Number	Number	Percent
Bassus diversus	5/20-8/5	124	2,233	2,218	18.0	99.3
Dioctes molestae	6/29-7/24	100	339	119	3.4	35.1
Orgilus longiceps	6/9-8/17	106	355	128	3.3	36.1
Eubadizon extensor and *M. thoracicus*	6/8-8/13	89	261	63	2.9	24.1
Macrocentrus ancylivorus	7/30-8/17	75	114	61	1.5	53.5
Glypta rufiscutellaris	7/31-8/17	74	57	38	.8	66.7
Apanteles spp. (Japan)	6/29-7/10	91	25	15	.3	60.0
Tachinid spp. (Japan)	7/8-7/16	*46	1	0	0	0.0
Cremastus spp. (Japan)	7/8-7/24	27	0	0	0	--
Pristomerus vulnerator (Panz.)	7/8-7/24	19	0	0	0	--

*Includes both sexes.

MEXICAN FRUIT FLY CONTROL

Fewer flies trapped than last year.--Throughout November, weather conditions in the lower Rio Grande Valley have been ideal for field work and the harvesting of fruit. Inspectors have been able to make more than the customary number of grove inspections and reports indicate that almost 100 percent of the groves are in excellent sanitary condition. Fruit shipments to the end of November total approximately 2,625 equivalent carloads. Three carloads have moved by water to eastern markets. Trapping records indicate that the adult fly population is considerably below that of last season. Only 5 *Anastrepha ludens* Loew. have been taken so far this year, while for the same period last season 34 had been trapped.

CEREAL AND FORAGE INSECT INVESTIGATIONS

More data on second generation of European corn borer in the Lake States.--As reported previously, midsummer pupation of corn borer larvae in the vicinity of Toledo, Ohio, was greater in 1936 than in any previous year on record. A. M. Vance and K. D. Arbuthnot, of the Toledo laboratory, now add the following observations. During the fall survey of borer abundance, from August 15 to September 15, evidence was procured to show that a partial second generation of the insect in 1936 was widespread in the surveyed portions of Michigan, Ohio, and Indiana. No midsummer pupation was found in western New York. Moths emerging from corn borer pupae, formed near the end of July or in the first few days of August in 1936, near Toledo, oviposited in late corn, the second-generation eggs hatched normally, and the larvae produced were able to reach maturity in the fall. Based on a count of 95 masses in the field, the average number of eggs per mass in the second generation was 21.7, as compared with the smaller average of 15.4 eggs per mass in the first generation of the same year. It is believed that sustained abnormally high temperatures near mid-July were responsible for the noticeable midsummer pupation in 1936. The biological reactions of the second-generation individuals overwintering to reproduce in 1937 is of considerable interest.

Laboratory rearing of European corn borer parasite on other hosts.--W. G. Bradley, Toledo, reports on preliminary observations to determine the suitability of *Ephestia kuehniella* Zell. as a medium for laboratory production of *Chelonus annulipes* Wesm., an egg-larval parasite of the European corn borer, following the successful adaptation of this host for similar purposes in the case of the pink boll worm parasite, *Chelonus blackburni* Cam.: "Through the courtesy of the Entomological Branch of the Canadian Department of Agriculture, a few mated *Chelonus* females were obtained. A supply of a rapidly developing genetic strain of the Mediterranean flour moth, in various stages of development, was obtained locally and adults from this material produced sufficient eggs for the extremely limited investigations here reported. It was found that eggs of *E. kuehniella*, supplied to gravid parasite females, were oviposited on quite as readily as are the eggs of *Pyrausta nubilalis* Hbn. From the 11 females from which parasitization of eggs was started, about 200 males and 100 females were produced in the first generation. Synchronization of host and parasite development was very exact, as is customary with this braconid. The average interval between oviposition and emergence of the adult was found to be 44.4 days at a constant temperature of 80° F. and a constant R. H. of 70 percent. Emergence of host adults and parasite adults started at the same time and the emergence curves of each were closely parallel. A loss of parasites was experienced somewhere between the time when the parasite larvae were in the early instars and the time of adult emergence, since, following a hatch of over 75 percent of the host eggs, dissections of small host larvae showed a fairly high percentage of parasitization, although subsequent parasite production was low. Although sufficient time has not elapsed to produce adult offspring from parents reared from E. kuehniella, dissections of host larvae show that females from this source are capable of producing viable eggs. Adults reared on flour moth larvae are shorter than normal for the species (6-7 mm, as given by Thomson), averaging about 4 mm. Attempts to obtain parasitization by Chelonus in the eggs of Sitotroga cerealella Oliv. were unsuccessful. Parasite females, actively ovipositing in eggs of E. kuehniella, showed no interest in grain moth eggs when these were substituted for those of the flour moth."

Field-corn resistance to European corn borer.--L. H. Patch and G. T. Bottger, Toledo, report on the comparative results with inbred strains tested in 1935 and 1936: Of 136 inbreds tested in 1935, 17 had percentages of borer survival lower than was expected on the basis of the trend with date of tasseling. Of the 17 inbreds, 15 were tested in 1936. In addition, six inbreds having high borer survival in 1935 and seven having intermediate survival were also tested. These additional 13 inbreds served as standards for comparison with the 15 inbreds thought to have some resistance to the borer. The percentages of borer survival in 1935 and 1936 are as follows:

Inbreds	Borer survival	
	1935	1936
	Percent	Percent
Six with high survival in 1935	13.4	8.9
Seven with intermediate survival in 1935	7.9	8.3
Fifteen with low survival in 1935	6.1	7.5

It may be noted that the range in the percentage of borer survival in 1935 was from 6.1 to 13.4, whereas in 1936 the range was from 7.5 to 8.9. The greatly decreased range in 1936 compared with 1935, was chiefly due to the date the plants became infested, with relation to the date of tasseling. In 1935 the eggs hatched on July 28, when many of the strains were tasseling. In 1936 the plants were infested on July 13, several days before any of the inbreds tasseled. Of the 15 inbreds with a low borer survival in 1935, 6 were relatively low in 1936, as shown below.

Inbreds	Borer survival	
	1935	1936
	Percent	Percent
Michigan 77	4.4	1.8
Illinois R4	5.1	4.0
Michigan 106	5.6	4.7
Iowa L317	3.3	5.3
Iowa I205	6.7	5.6
Kansas Y.S. 56	4.9	6.9
Means	5.0	4.7

The 1936 mean of the low-survival strains of 4.7 percent is 2.8 less than the group mean of 7.5 percent. The difference cannot be accounted for on the basis of the tassels, because the effect of tassels as a factor was slight, if any, in 1936. In addition, two of the seven inbreds with intermediate survival in 1935 were somewhat lower than the average in 1936. One was Missouri K7, with 9.2 and 6.4 percent borer survival in 1935 and 1936, respectively. The other was Iowa Bl 345, with 7.7 and 6.6 percent borer survival in 1935 and 1936, respectively.

Large-scale collections of European corn borer parasites in Massachusetts.--C. A. Clark and E. D. Burgess, of the Moorestown corn borer laboratory, report the completion of a large collection of material to furnish parasites for colonization in 1937. From 25 to 30 men were used during most of November and over 191,000 corn borer larvae were obtained. Parasitization of these larvae is expected to average approximately 24 percent, or considerably higher than the average parasitization of material received in previous years from Europe and the Orient. The 1936 collection was made in the vicinity of Concord, Mass., where imported parasites were liberated from 10 to 15 years ago and have now increased to a point where it is practical to make collections for colonization in other parts of the corn borer infested regions of the United States.

Critical temperature for flight of pea aphid.--L. P. Rockwood and Max M. Reeher, of the Forest Grove, Oreg., laboratory, report that alate viviparous females of Illinoia pisi Kalt. were taken from a plot of common vetch that had been seeded on September 4 and were placed on plants of transplanted Austrian winter field peas in a pot under a lantern globe in the laboratory on November 24. On the next morning, before heat was turned on, the pot of peas with alates was placed on a table near an east window and the lantern globe was removed. A small thermometer was suspended so that its bulb was close to the pea-plant tips. A close watch was kept on the alates. They soon began flying singly at a temperature of 61° F. Only 2 out of 14 that took flight in 15 minutes sustained flight long enough to reach the window 30 inches away. Most of them flew only from 4 to 6 inches down to the table. The experiment was repeated with the same procedure on November 27, when the initial temperature was 49°, before the heat was turned on. Slight movement on foot began at 50°. Most of the alates were stirring at 55° and one spread her wings but did not fly. Spreading of wings by individuals occurred eight times in 26 minutes between 58° and 60° and a few aphids dropped to the table without flying. At 60° one alate flew to the window, 33 inches of sustained flight. One female was observed to spread her wings 10 times at temperatures between 60° and 61° before she finally flew 3 inches. Spreading of wings was general between 60° and 61° but only five flew in 15 minutes, four flying only 3 to 4 inches. Between 61° and 62°, in 11 minutes, six flew, one 36 inches, diagonally to the window, the others, from 3 to 8 inches. The relative humidity in the room was 49 percent and the air was still. Observations were made in the field on alate viviparous females occurring naturally on a plot of common vetch on the afternoons of November 24 and 25. The thermometer was suspended on a level with the vetch-plant tips, 3 inches above the ground. Alates on vetch tips were watched for 45 minutes on November 24. Three were observed to fly (one twice) from 2 to 4 inches from the tip of one plant to the tip of another or down to the lower part of a stem. Temperatures ranged from 65° to 63°. Alates were observed to spread wings several times before flight. They seemed to be deterred by the intermittent breezes and actual flight occurred only in quiet periods. Macrosiphum granarium Kby., the aphid parasite Aphidius testaceipes Cress., small Diptera, aleyrodids, and jassids were flying readily at these temperatures. Sweeping over the plot, without touching the vetch tips with the rim of the net, caught no I. pisi. This indicated that no sustained flights were taking place. Relative humidity, registered on a hygrograph at 4 feet from the ground, was about 40 percent. On November 25, during similar observations for 1 hour and 15 minutes, I noted one alate which flew a few inches at 62° and another that flew 2 inches at 61°. One female spread her wings five times at a temperature between 61° and 60°, but did not fly. Two were observed to spread their wings at 56° to 55°. At 54° a few alates walked down the stems to the lower part of the plants. An Aphidius was observed to fly, sluggishly, at 55°. The air was quiet and the relative humidity, in the kiosk, was about 50 percent. These observations indicate that temperatures of at least 60° are necessary for flight of alate I. pisi that have matured in November, and that temperatures above 65° would probably be necessary for sustained flight from field to field.

JAPANESE BEETLE CONTROL

Improved eradication method.--Tree medication is now being employed to kill all elms in areas for which clearances have been obtained to clear-cut the properties. The new treatment, which closely resembles the method successfully employed to kill stumps of eradicated elms and to prevent sprouting, requires little time, few tools, and inexpensive materials. A girdle of bark about 12 inches wide is removed around the trunk of the elm to be treated, and a band of copper sulphate, in solid, crystalline form, is bound around the girdle and held in place by a suitable waterproof material. This results in the quick death of the tree and in the diffusion of a sufficient concentration of the chemical under the bark of the tree to prevent beetle infestation. There are approximately 2,600,000 elms in the 10-mile protective zone and 3,300,000 in the major diseased area that could be advantageously treated in this manner. Were these elms, which are of no aesthetic or commercial value, to be chemically treated and in addition approximately 1,000,000 dead or dying trees removed in the work area, there would be formed surrounding the infected area a barrier zone in which the only remaining elms would be those of aesthetic value. Work in inaccessible portions of the area would be eliminated. Chemically treated elms are permitted to remain standing for later utilization as fuel or lumber. To November 28, chemical treatments had been applied to 178,645 elms.

Trunk sampling locates Dutch elm diseased trees.--An experimental trunk-sampling project has just been completed in cooperation with the pathologists of the Bureau of Plant Industry at the Morristown, N. J., Dutch elm disease laboratory. Trunk samples were taken from 1,006 elms at St. Elizabeths College, near Morristown. This area was surveyed during the summer and a considerable number of infected trees were found. The trunk sampling was started about the time the leaves were falling and after the scouts had finished their systematic surveys of the section. Of the trees sampled, 41 were later confirmed as infected. Eighteen of these had been tagged by the scouts as possibly infected, 4 had been tagged as dead and dying elms, and 19 were without tags. Thus, by the trunk-sampling method the number of diseased trees found in this woodland was more than doubled.

Requisitions for additional W. P. A. workers.--A requisition was submitted to the New Haven, Conn., W. P. A. office for 108 unskilled laborers to be used on copper sulphate treatment of trees in the Branford, Conn., district. Requisitions have been placed with the New York W. P. A. offices for 740 additional men, bringing the New York quota of men on security wage to 1,500. In New Jersey, requisitions were placed for from 300 to 400 additional men to bring the State W. P. A. personnel up to approximately 4,000.

Governors Island free from Dutch elm disease.--Although Japanese beetles have proved troublesome on Governors Island, in New York Harbor, the Dutch elm disease has not yet reached that point. There are 60 elms on the island. Last summer these were examined on June 26, July 23, and August 3. No evidences of disease symptoms were noticed in the trees and none of them were classed as devitalized.

Christmas-tree inspection.--Those engaged in cutting Christmas trees in the lightly infested gypsy moth area report increased demands for the trees, with a possibility of the operators being unable to fill orders. A heavy fall of snow in northern Maine has held up cutting of both large and small trees. Trees of table size, about 12 to 18 inches in height, are completely buried, and the larger trees are difficult to cut and tie in deep snow. In Vermont the demand for balsam exceeds the supply, and some of the buyers are taking spruce as a substitute for balsam. One Christmas tree operator in Vermont is cutting about 150 Christmas trees that range from 20 to 40 feet in height. These are for use in hotels, banks, churches, public parks, and communities. Considerable expense is involved in the cutting, tying, hauling, and loading of such trees, and prices are necessarily high when the trees are shipped long distances. Inspection of these large trees also presents quite a problem.

Inspections increase in New England States.--Increased business in the New England territory is indicated by the larger volume of products presented for inspection. The stone and quarry industries are working overtime on orders for curbing for many miles of sidewalks being built along State highways. Increased building activities have created demands for more lumber. Lumber shipments tied up by the strike on the West coast have also created additional outlets for New England lumber. The demands for nursery stock this fall have exceeded those of several past fall-shipping seasons. There is now quite an outlet for trees for State-highway landscaping. New England nurseries that customarily dig deciduous stock for winter storage, to have it in readiness for early spring shipments, are placing more stock than ever in storage this fall. Extra inspectors have been required to examine the stock for gypsy moth infestation prior to storage.

Florida-bound plants and soil surrendered at road post.--Among the trucks stopped by the road inspector on the shift from midnight to 8 a. m. on November 19 was one covered with a tarpaulin and containing a horse. In response to the inspector's usual query, the driver stated that he had no plant material on his load. While examining the rear of the truck to confirm the driver's statement, the inspector saw some green foliage protruding through a hole that the horse had kicked in a hogshead in the truck. When this was brought to the driver's attention he admitted that he had on 50,000 greenhouse-grown tomato and pepper plants that he was taking from Schwenkville, Pa., to Deerfield, Fla., for planting. The temperature was below freezing at the time, but the driver claimed that the heat from the horse kept the plants from freezing. Rather than return to the area for proper inspection or wait until the following morning for inspection at the post, the driver surrendered the plants at the road station. His anxiety to surrender them was probably due to the fact that he did not expect to be caught transporting uncertified plants. Immediately upon their removal from the truck the plants froze. Examination of the large amount of soil accompanying the plants failed to reveal any Japanese beetle larvae.

Chemical treatments discontinued in Detroit and Chicago.--Freezing weather has forced discontinuance of soil treatments of sections infested with the Japanese beetle in Detroit and Chicago. Treating work in Chicago was begun on August 24 and continued until November 16. During that time soil on 105.2 acres was treated. In Detroit, 48.2 acres was treated while this work was in progress from October 6 to November 6. Very little work was possible in either city in November, as rain and low temperatures hampered the work. Treatments will be resumed in both of these cities as early as possible next spring. The only assistance rendered to the States by the Division of Japanese Beetle Control in these treating programs consisted of furnishing spray outfits, spray truck operators, and supervisors.

Railway Express drivers require quarantine instruction.--A recent change in the method of billing express shipments in Boston has necessitated the instruction of from 200 to 300 truck drivers in quarantine certification requirements. Until recently all shipments were brought into the receiving platform and were billed through the local office. This method has now been changed, and each driver is permitted to receive a shipment and bill it through direct to the consignee, collection being made from the consignee. This necessitates that quarantine information be supplied to each truck driver, whereas heretofore one man at the receiving platform was in a position to cull out uncertified shipments of quarantined products.

Still certifying stock in Baltimore.--Certified nursery stock is still moving in good volume from the Baltimore district, despite the fact that the ground is quite dry and a recent cold spell froze the soil to a depth of 1 or 2 inches. From all indications, local nurseries will complete their fall season with larger quantities of stock sold than in any fall since predepression days. This is partially attributed to the fact that home construction in the Baltimore area during the first 10 months of 1936 has resulted in the expenditure of nearly $10,000,000, according to figures released by the F. S. Dodge Corporation of New York.

Mums go South for the winter.--A large grower of chrysanthemums in the Philadelphia area has devised a new method of handling his stock plants. This year's stock plants, minus the blooms, are being dug, washed, and shipped to Florida, where arrangements have been made for planting them outside. Cuttings will be made from the plants with the idea that the cuttings will harden off and produce better stock plants for next year than those propagated in the Philadelphia area. Next summer the new plants will be returned to the grower and planted in his nursery. About 2,000 stock plants have thus far been inspected, certified, and shipped to Florida.

Fumigations to meet quarantine requirements.--A large nursery at Rutherford, N. J., has just completed the treatment with paradichlorobenzene of 22,600 hydrangeas in 3- to 6-inch pots, 35 cubic yards of soil being used in this treatment. Approximately 1,200 azaleas were also treated with the same fumigant for a South Jersey nurseryman. A large greenhouse at Freehold, N. J., was treated with carbon disulphide preparatory to certifying it for the propagation of geranium plants. Another greenhouse at Washington, D. C., used naphthalene flakes to treat the dirt floor in order to prepare it for certification.

FOREST INSECTS

Egg parasites of Malacosoma spp.--J. V. Schaffner, Jr., of the New Haven, Conn., laboratory, reports as follows on the egg parasitization of Malacosoma disstria Hbn. and M. americana Fab.:"Malacosoma disstria Hbn.--Late in the fall of 1935, 199 egg clusters were collected in some of the heavily infested localities of western Massachusetts and Vermont to obtain data on egg parasitization. Recently these data have been summarized and the parasites identified. Ooencyrtus clisiocampae Ashm. was found to be the most common of the three species of parasites reared. Ablerus clisiocampae Ashm. and Telenomus clisiocampae Riley were recovered in small numbers. The results are tabulated below.

Locality	Egg clusters	Approximate eggs	Parasites	Parasitization
	Number	Number	Number	Percent
Massachusetts:				
Shelburne-------	8	1,360	34	2.5
Vermont:				
Bellows Falls---	72	14,328	284	2.0
Do----------	17	3,247	60	1.8
Brandon----------	6	1,194	59	4.9
Pawlet----------	51	6,018	404	6.7
Rupert----------	8	1,048	111	10.6
Springfield-----	37	5,032	329	6.5
Total---------	199	32,227	1,281	--
Average--------	--	--	--	5.0

"One collection of 16 egg clusters of M. americana was made at Bellows Falls, Vt., in the fall of 1935. These contained approximately 3,136 eggs from which 230 parasites were reared, or an average of 7.3 percent. Three species of parasites were represented. Tetrastichus malacosomae Gir. was by far the most important species, while O. clisiocampae and T. clisiocampae were present in small numbers."

Willows severely damaged by insects.--Native willows in the vicinity of Coeur d'Alene, Idaho, are being severely damaged by two insects, Agrilus sp. and Cryptorhynchus lapathi L., reports W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory. This injury is interesting because Agrilus appear to act as the primary agent in most cases, with C. lapathi acting in a secondary role. Periodic examinations indicate that the buprestid kills a portion of the willow shoot from the top toward the base and may kill the entire shoot by repeated attacks during one or more seasons. Usually, however, a green portion is left at the base of the willow, which is then attacked by the weevil. Although quite severe in the vicinity of Coeur d'Alene, this injury is of not great economic significance primarily because willow is a temporary phase in the ecological successions of local forest types. In addition, all top-killed willow shoots are sprouting copiously from the base, which insures sufficient ground cover.

Students inspect laboratory.--J. C. Evenden, Coeur d'Alene, reports that on November 14 a group of 50 students from Washington State College, accompanied by R. L. Webster, head of the zoology department, and R. D. Shenefelt, instructor in entomology, visited the field laboratory at Coeur d'Alene. A series of illustrated lectures showing important forest insects, as well as the work of the laboratory, was given by the laboratory personnel.

Ips beetles cause extensive damage in Black Hills.--L. G. Baumhofer, of the Fort Collins, Colo., laboratory, reports that large groups of ponderosa pine ranging from sapling to mature size were killed by Ips oregoni Eichh. and Ips ponderosae Sw. in the Black Hills of South Dakota during the past season. Many of these groups contained more than 100 trees. Damage was most prevalent on poor sites, along the margins of timberland, on rocky points, and in farm yards. Losses were also heavy in an area suffering from winter injury, in the central part of the Hills, although not all winter-injured trees were attacked by *Ips*. Comparatively little damage occurred in thinned areas, except for small patches killed in some stands thinned last winter. These bark beetles normally infest fresh slash, logs, and weakened or dying trees. The present damage apparently resulted from a weakening of the trees by the very severe drought of 1936. Similar damage, on a smaller scale, occurred in the drought year of 1934. In 1935, when spring rainfall was above normal, this widespread damage by *Ips* disappeared and it is anticipated that with the return of normal precipitation, injury will again subside.

Forest tent caterpillar.--L. W. Orr, of the Milwaukee, Wis., laboratory, reports that the forest tent caterpillar outbreak in northeastern Minnesota was much more extensive in 1936 than in 1935 and present indications are that it will continue in 1937. Many of the summer-resort areas have suffered serious losses because of the caterpillar nuisance. Studies of the development of the insects during the summer showed that a large proportion of the larvae reached maturity, except in areas where they were so abundant that complete defoliation occurred before the caterpillars matured. In such areas there was a very high mortality. An average of between 30 and 40 percent of the cocoons produced adult moths. Egg counts made this fall indicate that, although the infestation will be decreased considerably in the older areas, the newer centers will be more heavily infested next year and much new area will be involved.

Spruce budworm on jack pine.--The pine-defoliating form of the spruce budworm has caused severe defoliation of jack pine in various parts of the Lake States in recent years, although little timber was actually killed prior to 1936. A number of new outbreak areas appeared last summer and Mr. Orr reports that the defoliation was unusually severe, resulting in considerable mortality in many of the affected stands. The defoliation was followed by the period of extreme heat and drought, and it is believed that this sequence of events explains the apparent greater destructive effects of the 1936 outbreak. It is now feared that there may be some danger of an *Ips* outbreak building up in the defoliated and weakened stands.

Drought plays important part in locust borer emergence on large trees.--R. C. Hall, of the Columbus, Ohio, laboratory, reports that during the past season numerous instances have been noted in central Pennsylvania, southern New York, and northern New Jersey of heavy emergence of locust borer adults from large roadside trees that had previously shown little or no emergence. Previous records and observations have shown that in normal years there is rarely any emergence of adult beetles from locust trees 6 inches or more in diameter. Records for 1936 show heavy emergence in trees as large as 24 inches in diameter. It appears that the severe spring and early summer drought made conditions favorable for locust borer development in large trees, and the combined effect of drought and heavy locust borer injury has killed many heretofore thrifty mature trees.

Insect carriers of Dutch elm disease.--C. W. Collins and T. H. Jones, of the Morristown, N. J., laboratory, submit final results of an experiment conducted during 1936 in cooperation with the Bureau's Dutch elm disease eradication unit and the Division of Forest Pathology of the Bureau of Plant Industry. From late in May until early in September a man was stationed at each of six points located in New Jersey areas where elms were numerous and where elms attacked by the Dutch elm disease had been previously found and removed. These men collected insects attracted to three felled elm trees. Six weeks after a tree was felled it was burned and another was felled in its place. Insects attracted to the trees were collected individually in gelatine capsules and sent to the laboratory for identification. Those insects known or suspected to breed in elm were submitted to the Division of Forest Pathology and were cultured to determine whether they were carrying the Dutch elm disease fungus (*Ceratostomella ulmi*). Except for species obtained in negligible numbers or those suspected of being infrequent in elm, the culture results are given in the following table.

Species	Adults cultured	Adults giving *C. ulmi*	
	Number	Number	Percent
Scolytus multistriatus Marsh.	7,200	492	6.83
Hylurgopinus rufipes Eich.	141	6	4.25
Saperda tridentata Oliv.	75	0	--
Neoclytus acuminatus Fab.	553	0	--
Xylotrechus colonus Fab.	89	0	--
Chrysobothris femorata Oliv.	203	0	--
Anthaxia sp.	82	0	--
Magdalis armicollis Say	1,421	1	0.07
M. barbita Say	337	0	--
M. inconspicua Horn.	474	0	--
Conotrachelus anaglypticus Say	140	1	0.71
Xylosandrus germanus Blandf.	842	1	0.11
Xyleborus sp.	24	0	--
Xylobiops basillare Say	118	2	1.69

In connection with the above experiment, elm wood infested with the immature stages of various insects was placed in large screened cages in the laboratory yard. This wood was obtained from trees cut down in the field and was known to contain the Dutch elm disease fungus. Insects that issued from the wood were collected individually in gelatine capsules and were cultured. Those species from which the fungus was obtained are listed below. Cage 1 contained wood collected during the winter of 1935-36 and cage 2 contained wood collected during the summer of 1936.

Species	Adults cultured	Adults giving C. ulmi	
Cage 1	Number	Number	Percent
Scolytus multistriatus	1,911	219	11.45
Hylurgopinus rufipes	15	8	53.33
Saperda tridentata	139	31	22.30
Magdalis armicollis	192	26	13.54
Cleridae (undetermined)	4	2	50.00
Capitonius saperdae	46	3	6.52
Lonchaea polita Say	36	1	2.77
Cage 2			
S. multistriatus	1,090	411	37.70
H. rufipes	373	194	52.01
Spathius canadensis Ashm.	30	3	10.00
C. saperdae	11	4	36.36
Platysoma coarctatum Lec.	8	3	37.50
Hymenoptera (undetermined)	55	3	5.45

The results show that adults of various species that issue from elm wood containing Ceratostomella ulmi carry the fungus. These include species that feed in elm in the larval stage or species associated with them as parasites and predators. The mere fact that they carry the fungus does not necessarily indicate however that they are capable of transmitting the disease to healthy trees. To date, the European elm bark beetle (Scolytus multistriatus) has been found to be the most important insect carrier. The native elm bark beetle (Hylurgopinus rufipes) has been proved experimentally to inoculate green logs with the fungus and, to a lesser extent, healthy trees.

Tree medication to prevent insect breeding.--C. W. Collins and R. R. Whitten, Morristown, report that experiments conducted by the laboratory during 1935 and 1936 have shown that elm trees can be satisfactorily killed and subsequent bark beetle attack satisfactorily prevented by medicating them with copper sulphate. Copper sulphate is now being used for this purpose at the rate of 120 grams per inch diameter at breast height. Further experiments may show that this amount may be reduced. Sodium arsenite and ammonium bifluoride have also given promising results.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Progress of the gypsy moth project.--At the end of November the number of W. P. A. enrollees employed on gypsy moth work of various types in Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, Maine, and Vermont had increased to 3,094. Since July 1, over 1,200,000 acres were scouted, principally in Vermont, Pennsylvania, Maine, and Massachusetts, and more than 750,000 egg clusters have been destroyed. Nearly 3¼ million trees in open country were examined, over one-third of them in Vermont. Slightly more than 5,000 acres of woodland were thinned, with approximately four-fifths of the acreage concentrated in Massachusetts and Pennsylvania.

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Snow forces temporary suspension of scouting.--Weather conditions were generally favorable for scouting in the New England area during the first 3 weeks in November; however, the first real snowstorm of the season, except for the mountainous regions of Vermont where snow fell in October, occurred on November 24 and 25. Scouting operations were temporarily suspended.

Large colony being eliminated in New York State.--Intensive clean-up work is being done at the site of a large infestation in Shawangunk, Ulster County, N. Y. In addition to the careful scouting of all trees and brush, all twigs, stones, and debris are being examined. The colony is in rural territory and is bisected by a main State highway. More than 14,000 egg clusters were located and destroyed by Federal workers by the end of November. These men are supervised by employees of the New York State Conservation Department working in close cooperation with the Federal Gypsy Moth Office.

No infestations found in New Jersey.--Particular attention is being given to the area surrounding an assembling cage in Mendham Township, Morris County, N. J., where a male moth was recovered during the summer. A special effort is being made to examine all small growth, dead wood, rocks, and ledges, which may soon be covered with snow. Crews are also engaged in very close scouting work in Passaic and Somerset Counties and in more open scouting in Essex, Morris, and Union Counties. No infestation has been found in New Jersey as a result of this work.

C. C. C. gypsy moth work increasing in New England.--Gypsy moth work performed by members of C. C. C. camps in Massachusetts, Connecticut, New Hampshire, and Vermont, in the region east of and adjoining the barrier zone, increased materially during November. Many new enrollees have completed their training period and have been transferred to field work, increasing the average number of men employed daily to 1,189 at the end of the month. Since July 1, C. C. C. men have scouted over 400,000 acres of woodland and more than 1,000 miles of roadsides; have examined nearly half a million isolated trees and more than 33,000 yards of stone walls; have thinned and cleaned over 2,500 acres of woodland; and have discovered and treated nearly 2,200,000 egg clusters. In addition, about 1,700 worthless isolated trees were destroyed.

Heavy infestation in Massachusetts being creosoted by C. C. C. men.--One phase of the work accomplished by the C. C. C. men is typified by their work in Bernardston, Franklin County, Mass. There is a heavy infestation of gypsy moths in this town in an area where maple, hickory, and ash predominate, with scattered pockets of gray birch, poplar, and oak. Although this growth is not considered especially favorable for the gypsy moth, the men have creosoted more than 25,000 egg clusters in an area of approximately 50 acres.

Preparation for future gypsy moth work in Massachusetts.--The E. C. W. Forester, assisted by a small crew of men from the Greenfield C. C. C. Camp, is engaged in type-mapping a block of woodland in Greenfield in preparation for future intensive gypsy moth work. They are also running base(or control) lines at certain blocks in the northeastern part of Greenfield and extending into the southern part of Bernardston.

Consultations with officials and supervisors.--Conferences were held during the month with officials of the National Forest Service from New Hampshire and Washington, D. C., and with the Commissioner of Conservation of Massachusetts, and methods of cooperation were discussed. Meetings of senior gypsy moth foreman and camp superintendents were held to discuss and clarify certain phases of the work, and lectures, accompanied by motion pictures, were given to some of the new men in order to give them a clear idea of the work to be performed and the reasons for doing it.

Progress of the brown-tail moth work.--There were 878 employees working on brown-tail moth projects in Maine, Massachusetts, New Hampshire, and Vermont at the end of the month. Most of the crews formerly engaged in cutting out favored food plants and destroying brown-tail winter webs have now been transferred to scouting work, as the leaves have fallen from deciduous trees and scouting conditions have improved. Since July 1, over 800,000 trees have been examined, about 85,000 trees have been cut, and more than 170,000 webs have been destroyed. Over 160,000 of these webs were in Maine, and none were found in Vermont.

PLANT DISEASE CONTROL

Results of blister rust control work in 1936.--The western white pine region reports that during the 1936 *Ribes*-eradication season, 53,412,208 *Ribes* bushes were eradicated from 313,260 acres in the States of Montana, Idaho, and Washington, with 210,624 man-days of labor; an average of 170 *Ribes* and 0.67 man-days per acre. In the Rocky Mountain region, consisting of the States of Colorado and Wyoming, 758,762 *Ribes* were eradicated from 15,113 acres with 6,286 man-days of work. According to preliminary information from the North Central region 139,604 acres of white pine were given initial protection from blister rust in 1936 by the removal of 52,970,019 *Ribes* bushes from 597,933 acres of land.

White pine planting survives drought.--O. J. Dowd of Ohio, in connection with white pine blister rust control work in that State, recently made a survival check on the Mahoning Valley Watershed where 200,000 white pines were planted in 1936. Mr. Dowd reports that, notwithstanding the terrific drought and accompanying hot weather during the summer, 85 percent of the young white pines have survived.

Infected pines at blister rust infection centers in Oregon removed.--The infected western white and sugar pines at the two blister rust infection centers on the Siskiyou National Forest in Oregon, namely, Windy Valley and Panther Mountain, were recently removed by two parties of the blister rust personnel from the Oakland, Calif., office. At Windy Valley about 120 trees, all of them less than 22 inches in diameter, were felled. About 60 percent were sugar pines, as far as could be judged from the ratio of the number of cone-bearing trees of each species. Some 70 percent of the pines were infected; many, however, only slightly. At Panther Mountain 120 sugar pines, including 7 mature trees, were removed from nearly 30 acres of steep, east-facing talus covered with dense brush, over which the infection extended. In addition seven large sugar pines were girdled. This removal of the pines is not regarded as a blister rust control measure to take the place of *Ribes* eradication, but only as a palliative that may delay the spread of the disease for 1 or 2 years. Its only advantage is to give more time for the establishment of a *Ribes*-eradication program in areas of commercial white and sugar pines.

Bulldozer operations in Montana.--During the week ending November 23, approximately 7,000 *Ribes petiolare* and 12,000 *R. inerme* bushes were eradicated along Big Creek near Haugan, Mont., by bulldozer and hand methods. Sixteen acres of heavy *Ribes* concentration in stream type were cleared during the week by slashing and bulldozer work. Although this progress measured in terms of acreage does not appear very great, the acreage, typifying the heaviest *Ribes* concentrations in the most difficult working conditions, represents the destruction of a very severe hazard along a considerable distance of stream. It is estimated that bulldozer work will be completed about the first of December.

COTTON INSECT INVESTIGATIONS

Cotton leaf worm control.--The early appearance and widespread distribution of *Alabama argillacea* Hbn. last season made it necessary to use control measures in nearly all sections of the Cotton Belt and provided an opportunity at several field stations to test the efficiency of insecticides. The small larvae are easily killed with almost any arsenical insecticide, but the large larvae are more difficult to kill and frequently cause considerable defoliation before they can be brought under control. As a result, farmers use many forms of arsenic, from lead arsenate to white arsenic or cattle dip. It is often difficult to determine whether control measures will pay, as defoliation of the plants after the crop is practically made results in but little damage and may be of benefit in reducing the number of boll weevils which breed in late squares and go into hibernation. In an extensive series of cage tests made by G. L. Smith and A. L. Scales at Tallulah, La., the mortality of half-grown larvae after the use of various insecticides was as follows: Paris green, 91 percent; calcium arsenate, 90 percent; lead arsenate, 82 percent; 75 percent calcium arsenate-25 percent paris green, 90 percent; 90 percent calcium arsenate-10 percent paris green, 87 percent; 95 percent calcium arsenate-5 percent paris green, 87 percent; 50 percent calcium arsenate-50 percent lime, 88 percent; 50 percent calcium arsenate-50 percent clay, 86 percent; 50 percent calcium arsenate-50 percent sulphur, 84 percent; 50 percent lead arsenate-50 percent sulphur, 88 percent; 90 percent sulphur-10 percent paris green, 78 percent; 95 percent sulphur-5 percent paris green, 76 percent; cube, derris, and devil's-shoestrings diluted with sulphur to 0.8 percent rotenone, 60 percent, 58 percent, and 40 percent, respectively; pyrethrum, 92 percent; 10 percent pyrethrum-10 percent paris green-80 percent sulphur, 65 percent; checks, 3 to 5 percent. At Florence, S. C., F. F. Bondy and C. F. Rainwater dusted two fields of late cotton for boll weevil control with a 1-2 mixture of calcium arsenate and lime, the last application being made on September 7.

By September 30 the untreated portions of the field were completely defoliated, while only a small amount of feeding was noticeable on the treated portions. On another farm, it was reported that dusting with lead arsenate failed to control the worms but calcium arsenate gave perfect control. The second generation of worms began stripping the plants at State College, Miss., about August 20. Most of the cotton fields were mature at the time and very little damage resulted. Two plots of late cotton where the bolls were not mature were dusted three times with calcium arsenate by H. C. Young at a cost of $2.18 per acre. Two of the applications were washed off by rain shortly after being applied. An increase of 288 pounds of seed cotton and a profit of $10.39 per acre were obtained. The plants had stopped blooming at the time and the increase in yield was due to the protection of the foliage enabling the bolls to mature and open normally. R. W. Moreland dusted some half-acre plots at College Station, Tex., on September 26 to determine the rate of killing with several insecticides. A shower of rain within 5 hours washed off part of the dust and a subsequent overflow of the river permitted only one examination to be made at the time. Twenty-six hours after the applications were made the mortality was as follows: Lead arsenate and lime (1-1), 46 percent; lead arsenate, 58 percent; lead arsenate and calcium arsenate (1-1), 60 percent; calcium arsenate, 74 percent; check, 0 percent. On October 14 the check plot was completely defoliated but very little ragging was evident in the other plots. K. P. Ewing and R. L. McGarr of Port Lavaca, Tex., report that a very hard fight was waged in many sections of southern Texas during July and August to bring this insect under control, owing to the more than 16 inches of rainfall in these 2 months. During the first week of July many farmers were required to poison twice in the same week, and probably more poison was used in this section than ever before. The insecticides used were calcium arsenate, lead arsenate, paris green, a surprising quantity of white arsenic, and in rare cases, cattle dip. Paris green was added to much of the calcium arsenate to give a quicker kill, and in some cases where the worms were large straight paris green was used. Lead arsenate used as a spray, 4 pounds to 50 gallons of water, applied with a barrel pump, was probably more extensively used in that section than any other insecticide. All of the arsenicals gave good control when they were not washed off by rains. On one farm 175 acres were dusted with a 3 percent nicotine sulphate-calcium arsenate mixture and gave 100-percent control of a heavy leaf worm population. Mixtures of calcium arsenate and sulphur 1-1 and 1-3 and mixtures of $7\frac{1}{2}$ to 10 percent paris green and sulphur used for boll weevil and fleahopper gave good control, while at greater dilutions the control was in proportion to the arsenical content. No control was obtained with 10 and 20 percent pyrethrum-sulphur mixtures. A. J. Chapman and H. S. Cavitt report that in the Presidio Valley of Texas the farmers kept the leaf worms in check by spraying with calcium arsenate. From 4 to 10 pounds in 50 gallons of water, applied with hand sprayers, were used per acre. Considerable airplane dusting was done for leaf worms in the Delta of Louisiana, Mississippi, and Arkansas, and in Texas. Calcium arsenate, or calcium arsenate to which 5 to 20 percent of paris green had been added, was generally used and gave satisfactory control. Several hundred acres were also dusted with calcium arsenate by airplane in Arizona.

Effect of calcium arsenate on certain soil types.--F. H. Tucker, State College, Miss., has submitted a progress report on the effect of calcium arsenate on certain soil types extensively used for cotton growing in Mississippi. Seven of the principal types were placed in concrete "bins" 3 by 16 by 1 foot, open at the bottom, and treated with calcium arsenate at the rates of 50, 100, 200, 400, 800, and 1,600 pounds per acre. Cotton, corn, and soybeans were grown on each plot during the summer and cover crops during the winter. Samples of soil were taken for analysis on May 14, 1935, 6 weeks after the calcium arsenate had been added, and again on July 16, 1936. During the 14-month interval the water-soluble arsenic had decreased from 23 percent to 74 percent in the different soil types receiving from 50 to 200 pounds per acre and from 40 percent to 80 percent in the plots receiving 400 to 800 pounds per acre. The average change in water-soluble arsenic in all soil types was from 6.3 to 2.6 parts As_2O_5 per million of soil in the plots receiving from 50 to 200 pounds of calcium arsenate and from 187 to 64 ppm of As_2O_5 in the plots receiving 400 to 1,600 pounds per acre, or 58 percent and 65 percent, respectively. The greatest relative changes were in the Norfolk and Sarpy types from the hill and Delta sections of the State, respectively. The least changes were in the Houston (northeast prairie) and Cahaba (northeast highland) types. The reduction in water-soluble arsenic in the Norfolk sand is of interest because it is one of the types that showed heavy damage to crops. It is probable that the arsenic was carried out with the drainage water or seeped below the sampling level. The crop yields obtained on the concrete plots in 1935 and 1936 were not satisfactory because of their small size. The extremely dry condition at planting and throughout the season in 1936 also affected the fields so greatly they are not considered reliable. Delay in germination was evident, however, on the plotsreceiving the heavier dosages of calcium arsenate in both years. In field plots planted to cotton in 1935 on Ruston, Memphis, Sarpy, and Houston types the yield was reduced only on the Ruston plots where 200 or more pounds of calcium arsenate per acre were added. The Ruston plots were replanted to cotton in 1936 and yields were reduced on the plots with 400 and 800 pounds per acre and no cotton was produced on the 1,600-pound plot. The indications are that the plot which received 200 pounds per acre is recovering.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Intensive gin-trash inspections were continued in the Western Extension of Texas during the first 2 weeks of November, at which time a freeze was experienced in that area. This greatly lowered the efficiency of inspection and, in view of the large amount already done, inspections were discontinued. No additional specimens of the pink bollworm were found. A machine was operated in Lower California and another in Sonora, Mexico, without finding any infestation. In the Tucson area of Arizona a machine was operated for about 2 weeks without finding any specimens of the pink bollworm; however, 25 specimens of the Thurberia weevil were found. At the end of November gin-trash inspection had been completed in all areas except the Salt River Valley of Arizona. Two machines are operating in this area and will complete the season in about 2 more weeks.

Field clean-up in the Big Bend of Texas.--The cleaning of cotton fields in the Big Bend area of Texas to help control pink bollworm infestation got under way during the month. In many cases farmers had not completed picking, and for this reason it was necessary to use only small clean-up crews. By the end of the month picking was completed to the extent that plenty of acreage was available for cleaning. As a rule the most heavily infested fields are being cleaned first. Stalks have been cut on 932 acres and the debris raked up on 375 acres. There has been considerable damp weather, which has prevented stalks from drying out very fast and, as a result, material has been burned on only 126 acres.

Wild cotton eradication.--The eradication of wild cotton in southern Florida was continued with W. P. A. funds until November 7 and since that time it has gone forward using Bureau funds. Extremely heavy rainfall during the summer months has resulted in all vegetation making very rank growth, and in many cases old trails which have been cut had grown up so that it was necessary to almost cut new trails to reach the plant colonies. An effort has been made this season to reclean colonies before seedlings reach the fruiting stage. This naturally results in the work going forward more slowly than usual, as the small plants are harder to locate. Notwithstanding the above difficulties, the work has made very good progress. During the month colonies covering some 3,000 acres were recleaned, and 516 mature, 116,079 seedling, and 3,135 sprout plants were removed. Several small colonies were located and cleaned for the first time. They covered only about 8 acres and consisted of 78 mature and 196 seedling plants. Toward the close of the month the Cape Sable area had dried out considerably and steps were being taken to reestablish the camp there.

Thurberia-plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has made very good progress. During the first half of the month part of the laborers continued working out from Tucson, but during the latter half of the month all of the laborers worked from Camp Lawton. In this latter section it was necessary to cover a considerable area in which no plants were found, as there was no definite information as to the altitude above which plants would not grow. The highest altitude at which plants have been found since this work got under way is 5,600 feet. During the month 7,835 acres were gone over and 9,073 Thurberia plants were destroyed.

Road-station inspection.--During November, 11 interceptions were made from the 1,057 cars inspected at the Marfa, Tex., road station. Most of the interceptions consisted of small lots of seed cotton and 6 of them were found to be infested with the pink bollworm, 45 living larvae being taken. One interception was of particular interest. It consisted of 84 locks of seed cotton found between the bed and cab of a truck. From this material 28 living larvae were taken, 8 of which were in the lint and the remainder in seed. To date 15 infested interceptions have been made and 73 living and 18 dead larvae of the pink bollworm were taken. In most instances the infested interceptions were made from trucks that go back and forth between Marfa and the Big Bend. Truck drivers have been requested to clean their trucks before leaving the Big Bend, and the few interceptions made indicate that they are making an effort to do so. The fact that a few locks of seed cotton are found in some of the trucks further indicates that the road-station inspectors are efficient in their work.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Rotenone dusts give promise in control of pea weevil.--T. A. Brindley, of the Moscow, Idaho, laboratory, reports that as a result of large-scale field tests during the 1936 season, dust mixtures containing 1.0 or 0.5 percent rotenone, with finely ground diatomaceous earth, tobacco dust, or sulphur as diluents, reduced the infestation by Bruchus pisorum L. more than 99 percent, on an average, in green peas harvested for canning and in dry peas harvested for seed or processing, as compared to the pea weevil infestation in untreated plots. These dust mixtures gave results superior to treatments with undiluted cryolite, calcium-arsenate-sulphur (1-5), or paris green-lime (1-5). Five treatments were applied to these experimental plots at a dosage of 20 pounds per acre per application, with the exception of the plot treated with the dust mixture containing 0.5 percent rotenone in diatomaceous earth, which received 40 pounds per acre per application. In the untreated plots, on an average, approximately 43 percent of the peas were infested by the pea weevil.

Canned peas treated with derris show no derris constituents.--In experimental work in which derris has been used for combating the pea aphid, a question has arisen regarding the possible contamination of the canned peas from plants treated with this insecticide. In order to obtain data on this problem, R. A. Fulton, of the Columbus, Ohio, laboratory, recently analyzed canned peas that had been treated by dusting or spraying with derris, at the dilutions found to be effective in the control of Illinoia Kalt. The canned peas were subjected to chemical treatments to remove any traces of the active ingredients of derris contained therein. The resulting product was then tested for the presence of rotenone or other derris derivatives through the medium of the goldfish method and also by colorimetric analyses. In six analyses no trace of derris constituents could be detected in any of the peas that had been removed from treated plants.

Nicotine peat ineffective against cabbage worms.--C. E. Smith, of the Baton Rouge, La., laboratory, reports that in field experiments to obtain data on the possible value of nicotine peat moss dust in controlling the more common species of cabbage worms, including principally the cabbage looper (Autographa brassicae Riley) and the imported cabbage worm (Ascia rapae L.), this material proved to be distinctly inferior to derris dust mixtures containing 1.0 and 0.5 percent rotenone, respectively, and also inferior to a specially prepared undiluted calcium arsenate.

Dilutions of dichloroethyl ether effective against wireworms will not kill lima bean plants, tests indicate.--M. W. Stone, of the Alhambra, Calif., laboratory, reports that in preliminary experiments to determine the effect of dilute solutions of dichloroethyl ether on growing lima beans, it was found that this material at concentrations of 1, 3, and 6 cc, respectively, per gallon of water, applied at the rate of 100, 200, and 300 cc, respectively, to lima beans grown in 6-inch flower pots, did not retard the growth of the lima beans. There was, however, a slight retardation of growth when using the dichloroethyl ether at concentrations of 9 to 12 cc. Since field applications directed against the sugar beet wireworm (Limonius californicus Mann.) and associated species showed that a 94-percent kill of these pests could be obtained when using dichloroethyl ether at a concentration of 5 cc in 1 gallon of water per 15 linear feet of row, it appears that it will be possible to consider seriously the direct application of the dichloroethyl ether solution to the main crop in the field in combating wireworms instead of planting trap rows of the host plant, intended for ultimate destruction during the process of treating such trap rows to kill the wireworms.

Status of beet leafhopper parasites varies with host-plant association.--C. F. Henderson, of the Twin Falls, Idaho, laboratory, reports that in a dissection of approximately 5,000 females of Eutettix tenellus Bak. collected on Russian-thistle during the progress of a fall survey in Idaho 38.3 percent of them were found to be parasitized by Pipunculus subnitens Cress. In collections of E. tenellus females made from sage growing in areas adjacent to the Russian-thistle, an average of 22.5 percent of the dissected females in approximately 2,500 dissections were found to be parasitized by P. subnitens. It is thought that the difference between the percentage of parasitization in Russian-thistle areas as compared to the adjacent sage areas can be explained on the basis of the inability of the parasitized E. tenellus females to move as readily from Russian-thistle to sage as did the unparasitized individuals.

Celery leaf tier not abundant in Florida.--C. B. Wisecup, of the Sanford, Fla., laboratory, reports that Phlyctaenia rubigalis Guen. is practically nonexistent in the Sanford area during the current crop season. Field searches have disclosed but two moths, and no signs of larvae. This scarcity of leaf tiers may be attributed to a number of factors. Seed beds were late, and the stand of plants sparse, so that all beds having large plants were pulled over very heavily by October, leaving a very poor and uninviting cover in which the P. rubigalis moths could hide. It is evident that if the moths came into the areas as expected, they had very few suitable locations in which to settle. In addition, the unusual abundance of the garden flea hopper (Halticus citri Ashm.) caused practically every grower to dust his seed beds regularly with pyrethrum. It seems reasonable that this repeated dusting would destroy any brood of the celery leaf tier attempting to become established in the seed beds. Owing to continued dry weather, the native vegetation has been very sparse and tended to dry up early, so that it would have been unsuitable for developing a brood of celery leaf tier.

INSECTS AFFECTING MAN AND ANIMALS

Phenothiazine shows promise as preventive of screwworm infestation.--H. E. Parish and J. T. Bigham, of the Menard, Tex., laboratory, have obtained the following results in tests of various materials for preventing reinfestation of screwworms in range livestock. Each of the materials was applied every 2 days until wounds had healed, to animals suffering a natural screwworm infestation.

Material tested	Cases treated	Average re-infestations per case	Average days case required to heal
	Number	Number	Number
Pine-tar oil	162	.72	23.4
Bone oil	87	.68	25.9
Pine-tar oil 85 percent, powdered derris 15 percent	66	.27	26.2
Pine-tar oil 85 percent, naphthalene 15 percent	66	.64	24.8
Phenothiazine	110	.25	21.9

Wettable sulphur effective in control of goat louse.--The demonstration work on the use of a wettable sulphur dip for the destruction of goat lice carried on by O. G. Babcock on several ranches in New Mexico and Texas has elicited many reports from ranchmen and county agents on the excellent results obtained with this material. One ranchman of Lake Valley, N. Mex., writes: "There are no lice present on dipped animals and none were found at time of fall shearing, September 30, the first time I have had my herd clean of lice. The sulphur dip, to my mind, is superior to any dip I have ever used, both in killing the lice at time of dipping and in keeping the goats free from the pests for several months afterward." County agent Paul Brown of Lordsburg, N. Mex., reports: "One ranchman said that his goats yielded approximately one quarter more hair as a result of the dipping." The county agent of Bosque County, Tex., reporting on an examination of a flock of goats that had previously been treated with the sulphur dip, states: "At this time the goats showed a pronounced increase in oil and lustre in the fleece, appeared more thrifty, and had put on weight. No lice were found on any of the goats inspected at this time."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Three living larvae of the West Indian fruit fly (Anastrepha acidusa Walk.) were collected on July 3, 1936, in cashew (Anacardium occidentale) in the field at Dorado, P. R. Three larvae of the Mediterranean fruit fly (Ceratitis capitata Wied.) were intercepted at Boston on October 26 in a pear in ship's stores from Greece. A living larva of the pyralid Morpheis smerintha Hbn. was taken at Laredo, Tex., on August 23 in a bamboo stalk in baggage from Mexico. The coccid Asterolecanium miliaris longum Green arrived at Washington, D. C., on March 12 on dried bamboo leaves in the mail from St. Kitts. Sixteen living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were taken at Norfolk, Va., on October 8 in turnips in stores from Denmark. A living specimen of Orchidophilus gilvonotatus (Barber) was intercepted at San Francisco on August 10 in an orchid, Phalaenopsis amabilis, in cargo from the Philippines. This weevil was formerly known as Ceutorhynchus gilvonotatus Barber. A living larva of Curculio venosus Grav. arrived at Chicago, Ill., on October 23 in an acorn in the mail from England. An adult of this weevil was intercepted at Boston in 1926 with chestnuts in cargo from Italy. Living specimens of Platythrips tunicatus Hal. were taken at New York on August 18, 1936, on heather in the mail from Scotland. Living larvae of the chrysomelid

Psylliodes chrysocephala L. were found at Baltimore, Md., on August 31 in turnips in ship's stores from England. A living specimen of the coccid Steingelia gorodetskia Nass. was intercepted at Honolulu, Hawaii, on March 19 in packing material for Aster cordifolius in the mail from England. A living specimen of Cicadella jucunda Walk. arrived at Charleston, S. C., on June 25 with banana debris in cargo from Honduras. Living specimens of Anaphothrips orchidaceus Bagn. were intercepted at the airport at Brownsville, Tex., on May 6, 9, and 16 on orchids in cargo from Mexico. J. C. Crawford reports that this thrips was originally described from England on orchids in greenhouses. Tropical America is probably the original home.

Correction.--In the December 1, 1936, News Letter (vol. 3, no. 12) the family of Orthaea servillei Guer., mentioned on page 25, line 14, should be Lygaeidae.

Straw jackets around liquor harbors bruchids.--In making the usual inspection in connection with the packing-material quarantine at New Orleans, rye-straw jackets used as packing in cases of Benedictine were found to be contaminated with a small amount of narrow leaf vetch (Vicia angustifolia), consisting of stems, seed pods, and seed. The New Orleans inspector who examined the packing material found several living specimens of Bruchus luteicornis Illiger in the seed pods and straw jackets. This bruchid is not known to occur in the United States.

Melon fly pupae intercepted in sphagnum moss packing.--A collaborator of this Bureau at the port of San Francisco found 14 pupal cases and dead pupae of the melon fly (Bactrocera cucurbitae Coq.) in sphagnum-moss packing around the roots of young palm trees arriving from the Hawaiian Islands by express. This interception serves to illustrate again the unexpected manner in which certain pests may arrive at our ports. In this instance the insects were dead, but there is always the possibility that living pests will find entrance in a similar manner.

Collect ample material.--Among the foliage and stems of a quarter of a pound of parsley in stores from France a New York inspector found six specimens of thrips. These were determined by J. C. Crawford as Anaphothrips obscurus Mull. (2), Thrips tabaci Lind., Frankliniella intonsa (Tryb.), Thrips fuscipennis Hal., and Taeniothrips atratus Hal. Sometimes it pays to take all specimens possible rather than be satisfied with only one or two.

Balsa wood infested.--Balsa wood imported at New York and believed to be from Ecuador was found to be infested by an airplane-model manufacturer who turned three specimens of the insect over to one of the inspectors at Boston. The insect has been determined by Grace A. Sandhouse as Xylocopa transitoni Perez.

Bulging purses under suspicion.--Stateroom inspection of a vessel from Mexico by a New Orleans inspector revealed soil in a discarded shoe box. Two discarded plants were found in the stateroom but none in baggage and the passengers declared they had no plants; however, examination of the contents of the ladies' bulging purses disclosed three dwarf begonia plants and one cactus, all potted in soil.

Another overburdened purse.--A couple claiming to be from California and fully informed as to plant quarantines made sure they could bring back their dog before taking it to Mexico. Returning 10 days later they claimed to have no plant material. The Laredo customs inspectress insisted on examining the lady's purse, however, and found two oranges in it. In the meantime the plant quarantine inspector had found potatoes and apples concealed in various places in the car. The woman said she would not pay her fine but would go to jail, but her husband paid the fine and apologized for her behavior.

Cook found guilty.--"Mango Mike" is a cook in the dining car of the Missouri Pacific Railroad operating between Mexico City and San Antonio, Tex. The United States customs inspectors board the train at Laredo, Tex., and inspect the train and the passengers' baggage en route to San Antonio. On one trip the inspector picked up a mango seed, on another trip he found a mango in the cook's pantry, and the evidence all pointed to Mike as being the guilty person. On a third trip mangoes were found in a fruit jar hidden under the fish and ice. The inspector took the mangoes and Mike to the chief steward and said: "This is the third time I have found mangoes or evidence of mangoes in Mike's kitchen and he has to pay a fine or something will be done about it." The steward said to Mike: "Get your things off the car at San Antonio; you are being put on the ground for 30 days." At the end of 30 days Mike was back in his kitchen and declared he hadn't really missed any meals, but had postponed a few, and that his craving for mangoes was entirely cured.

Pathological interceptions of interest.--Ascochyta pisi Lib. was intercepted from Hungary for the first time September 26 in hairy vetch seed in cargo at New York. Ceratostomella fimbriata (E. & H.) Ell. was intercepted on carrot from England October 27 at Port Arthur (see News Letter vol. 3, no. 12, p. 26, December 1, 1936). Our first interception of Cercospora nicotianae Ell. & Ev. was made at New York on November 23 in tobacco leaves in stores from Haiti. Cercospora petroselini Sacc. was intercepted for the first time on November 19 at Philadelphia on parsley from Morocco. An undetermined species of Ascochyta was found on the same spots. Cylindrosporium chrysanthemi Ell. & Dearn. was intercepted for the first time on November 21 at Brownsville on chrysanthemums from Mexico. Gloeosporium melongenae Ell. & Hals. was intercepted from Europe for the first time on November 5 on eggplant from Italy. Our first interception of Gloeosporium musarum Cke. & Mass. from Brazil was made on November 25 at Boston. Our first interceptions of Mycosphaerella shiriana Miy. were made on October 9 and November 10 at New York on rice hulls from Japan. A fungus of the Myxosporium and Gloeosporium type was found on spruce cones from Germany at New York on October 8. Specialists have been unable to find any species description, in either genus, that agrees with the material. Phragmidium disciflorum (Tode) James was intercepted for the first time on November 4 on a rose from England at Washington. Our first interception of Septoria primulae Buch. was made at Norfolk on November 5 on a primrose from England.

Correction.--The new generic name for Anguillulina tritici (Steinbuch) Gerv. and v. Ben. was erroneously given as Ditylenchus in the last News Letter (vol. 3, no. 12 p. 26, December 1). The new combination for this species is Anguina tritici (Steinbuch) Filipjev.

DOMESTIC PLANT QUARANTINES

Standardization of State plant quarantines recommended.--The national conference of State quarantine officers at a meeting held in Chicago on November 5 and 6 passed resolutions recommending that each regional plant board appoint a committee to review the State quarantines and to recommend to the National Plant Board changes that will accomplish uniformity within the group of States comprising the regional board. Further, that the national board, after studying the data of the various committees, recommend such changes in existing quarantines as are needed to bring about complete uniformity on the part of all States. The conference further recommended that the Bureau make adequate annual surveys of pests under quarantine, or those which may be placed under quarantine, and provide the States each year with information as to the areas affected.

Post Office Department recognizes State quarantines.--Through an amendment to postal regulations, provision has been made for postmasters to turn back to senders packages of plants or plant products shipped in violation of State plant quarantines. This service is available to States that have arranged for the terminal inspection procedure. The postal amendment, approved on October 15, also provides for the issuance of appropriate instructions to postmasters to prevent the acceptance of certain plants and plant products when presented for mailing in violation of such State quarantines or regulations. This is in line with the amendment on June 4, 1936, to the Federal law, extending the provisions of terminal inspection to State plant quarantines.

Peach mosaic work.--Over 50 percent of the California growers having peach mosaic diseased trees on their properties who have been contacted have voluntarily agreed to eradication and have signed releases to this effect, and the work of removing these diseased trees is going forward, with the employment of 78 persons. Full cooperation has been extended by growers in the eradication areas in Colorado and Utah. Forty-six persons are employed in Colorado, removing the infected trees found in the inspection work during the field season.

Citrus canker activities.--All the citrus-growing areas of Texas, including the Winter Garden, Laredo, and Falfurrias districts, have been covered in recent weeks by systematic and thorough inspections for citrus canker. The work is again being centered around the known infected areas of the Houston-Galveston-Beaumont district, to reinspect the few remaining citrus plantings, principally of the satsuma type, and to remove any seedlings or sprouts that have appeared on eradication areas. In Mississippi and Alabama work is centered on the tier of three southern counties in each State where large numbers of abandoned trifoliates abound as the rootstock of satsuma plantings, now dead, and in pecan groves, pine stands, old nurseries, fields, and swamps. Careful inspection has resulted in finding no canker in either of these States. Approximately 100 men are employed in each State and they have removed over 700,000 worthless trees in Mississippi and over 1,000,000 in Alabama. Inspection and eradication is also continued throughout all areas in Louisiana in which citrus is found.

Phony peach emergency funds increased.--A further allotment has been provided from emergency funds sufficient to continue eradication activities in all affected States during December and January. During the life of the project, dating from August 1935 to the close of October 1936, over 48 million worthless peach trees have been removed from 11 infected States. In Louisiana the work of removing approximately 5,000 diseased trees is being completed by the middle of December.

Mississippi revises phony peach disease quarantine.--Hand culling of peach borer infested trees is no longer a condition under which peach and nectarine nursery stock may be certified for entry into 17 counties in Mississippi, under a revision of the phony peach disease quarantine of that State, which became effective on October 4. These counties were recently established as an eradication area in the campaign against the disease in that State, and no host trees may be shipped into these counties unless they have been produced in a county in which the disease has not been found or in a nursery, the environs of which have been inspected and no such disease found within a mile thereof. Nursery stock from which peach borer infested trees have been removed may be shipped to points in Mississippi outside the eradication area.

M. J. Kelly assigned transit inspection post.--Michael J. Kelly, of the Japanese beetle inspection force, has been placed in charge of transit inspection activities in the Northeastern States, with headquarters at New York City. Mr. Kelly has had several years' experience in the Department.

"Laundry" label used on restricted plant materials.--Uncertified hemlock and laurel wreaths shipped in a carton bearing the declaration of "laundry" and moving by express from the gypsy moth infested area in Massachusetts to a point in Kentucky, were recently intercepted by transit inspectors at Cincinnati. The signature of the shipper, who was obviously attempting to evade either the classification rates or the quarantine regulations, was illegible; however, his identity can be determined from the local address.

Mexican fruit worm quarantine regulations revised.--Regulation 7 of the Mexican fruit worm quarantine was revised effective November 16, providing authority for the Chief of the Bureau to make such modifications as may be considered necessary as to the duration of the period during which no host fruits are permitted to develop in groves or exist in the regulated area. The purpose of the revision is to facilitate the prompt modification of the host-free period in the event a fruit-fly infestation should be found.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Another European weevil in the United States.--W. J. Brown, of the Canadian Entomological Branch, recently submitted several specimens of a weevil collected in Nova Scotia and New Brunswick in 1936. These have been identified by L. L. Buchanan as the European *Trachyphloeus bifoveolatus* Beck. Although not recorded heretofore from North America, this species has been present in New York State for a considerable period. Specimens in the National Museum collection from Barneveld, N. Y., in 1919, and others from Oriskany, N. Y., in 1931, had been identified as *T. davisi* Blatchley, a species first described in 1916 from Staten Island, N. Y. In the absence of authentic examples of *T. davisi*, its status is somewhat uncertain, but published statements indicate that *davisi* Blatchley 1916 is not a synonym of *bifoveolatus* Beck 1817.

Valuable collection of fruit-fly material from Africa.--In connection with the fruit fly investigations in Africa conducted by the Bureau during the past year, an exceptionally fine lot of Trypetidae was collected by Fred A. Bianchi and Noel Krauss and referred for identification. C. T. Greene has studied this material, which comprised 1,660 specimens, and reports that of these 1,216 belong in the genus *Ceratitis* and represent 12 species. Seven of these species, four of them undescribed, are new to the National Museum collections. There were 431 specimens of the genus *Dacus* (including *Tridacus*), representing 13 species, of which 5 are new to science and 12 not previously contained in the Museum collection. Large series of excellent specimens in the case of a number of species both in *Ceratitis* and *Dacus* will greatly facilitate the critical study of these groups. Included with the material belonging to these genera were 13 specimens of miscellaneous Trypetidae representing 7 other genera and including 8 species new to the collection, of which 2 are undescribed. Additional trypetid material collected by R. H. Van Zwaluwenburg, also in Africa, has not yet been worked over in detail but is certain to contribute more valuable specimens to the national collections of this group.

Habits of a phytophagous chalcid.--Recently A. B. Gahan identified as *Bephrata maculicollis* Cam. specimens received for determination from A. P. Trocconis, of Maracay, Venezuela. A letter accompanying the material stated that this chalcidoid attacks the very young fruit of *Annona muricata*. The egg is deposited within the individual seed or nut. Before the seed is mature the completely developed insect perforates the cuticle of the seed and emerges through the surrounding fleshy tissue, appreciably injuring the fruit. These observations seem to be the first that have been recorded on the habits of this species.

Occurrence in the United States of a Japanese parasite of Comstock's mealybug.--Specimens reared from *Pseudococcus comstocki* Kuw. by R. N. Jefferson, at Blacksburg, Va., have been determined by A. B. Gahan as the encyrtid *Clausenia purpurea* Ishii. This species was originally described from Japan and was not previously known to occur in the United States, although an apparently unsuccessful attempt to introduce it into California was made in 1916.

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Rediscovery of a species of Cicadellidae.--A specimen, in excellent condition, determined by P. W. Oman as *Neocoelidia barretti* Baker, was found in banana debris from Mexico at Brownsville, Tex., on November 13 by J. M. Singleton, of the Division of Foreign Plant Quarantines. Although *N. barretti* was described in 1898 from two specimens, which are now in the National Museum, this appears to be the first authentic collecting record for the species since its description.

Records of new aphids from port interceptions.--Four species of aphids, all determined by P. W. Mason as apparently representing new species of the genus *Kakimia*, have been received for determination with material intercepted by the Division of Foreign Plant Quarantines during the past summer. Two of these were on saxifrage, one on lettuce, and one on *Sempervivum*. According to available records, species of *Kakimia* usually live on the Saxifragaceae. Lettuce and *Sempervivum* in the above cases were probably secondary hosts.

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